INTEGRATING THE ACTIVITIES OF FLUXNET-CANADA, THE NORTH AMERICAN CARBON PROGRAM, & NASA GODDARD'S BIOSPHERIC SCIENCES BRANCH

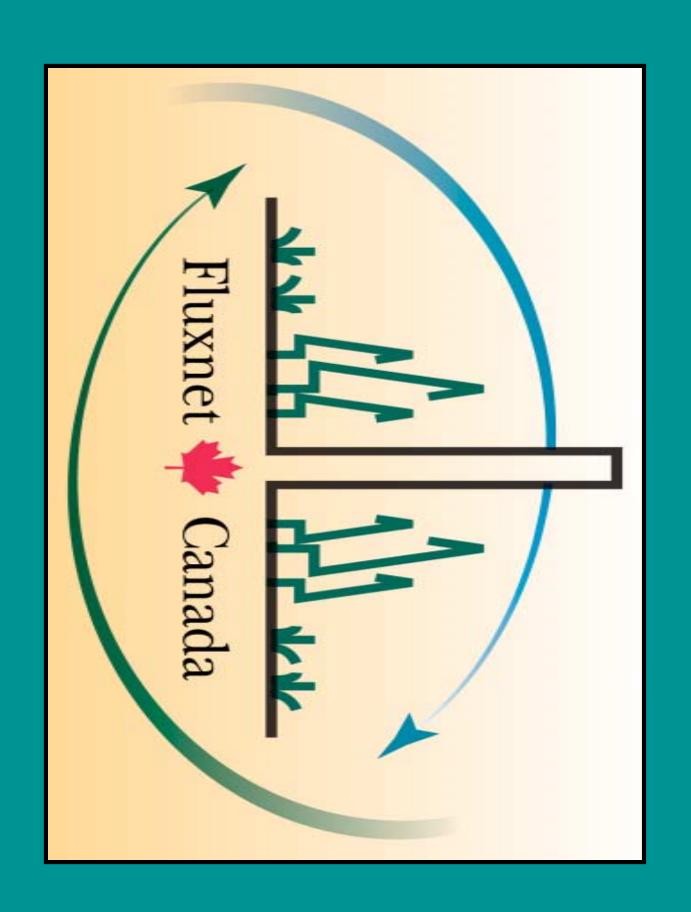
HANK MARGOLIS
SCIENTIFIC DIRECTOR AND PRINCIPAL INVESTIGATOR
FLUXNET-CANADA RESEARCH NETWORK (FCRN)

NASA-HQ SITE REVIEW MARCH 18, 2004

SABBATICAL VISIT AT NASA-GODDARD

DECEMBER 2003 TO JUNE 2004

DECEMBER 2004 TO JUNE 2005

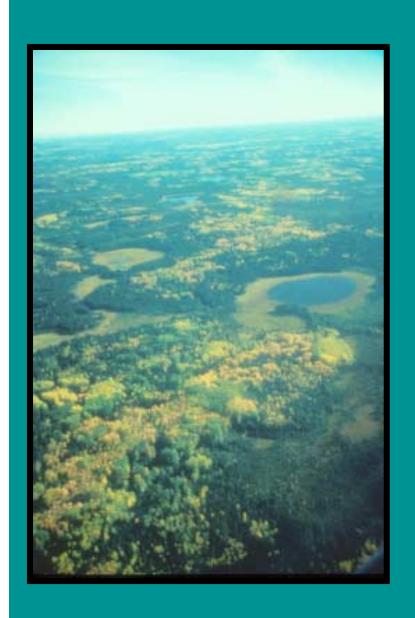


CANADA



9.2 million km²
45% of North America

CANADIAN FOREST SECTOR



- 44% of the Canadian land surface
- 4.0 million km²
- 20% of the North American land surface

There is general agreement that three factors play a critical role in determining the sink/source status of Canadian forests.

Climate Natural Disturbance Land Use Activities

A National Research Network:

Fluxnet-Canada

An expansion of BOREAS to a national scale.



FLUXNET-CANADA

FUNDING PERIOD: 2002-2007

 ABOUT \$4 MILLION (US) PER YEAR (50-50% UNIVERSITY AND GOV'T) (NOT FULL-COST ACCOUNTING)

The general objectives of the network are:

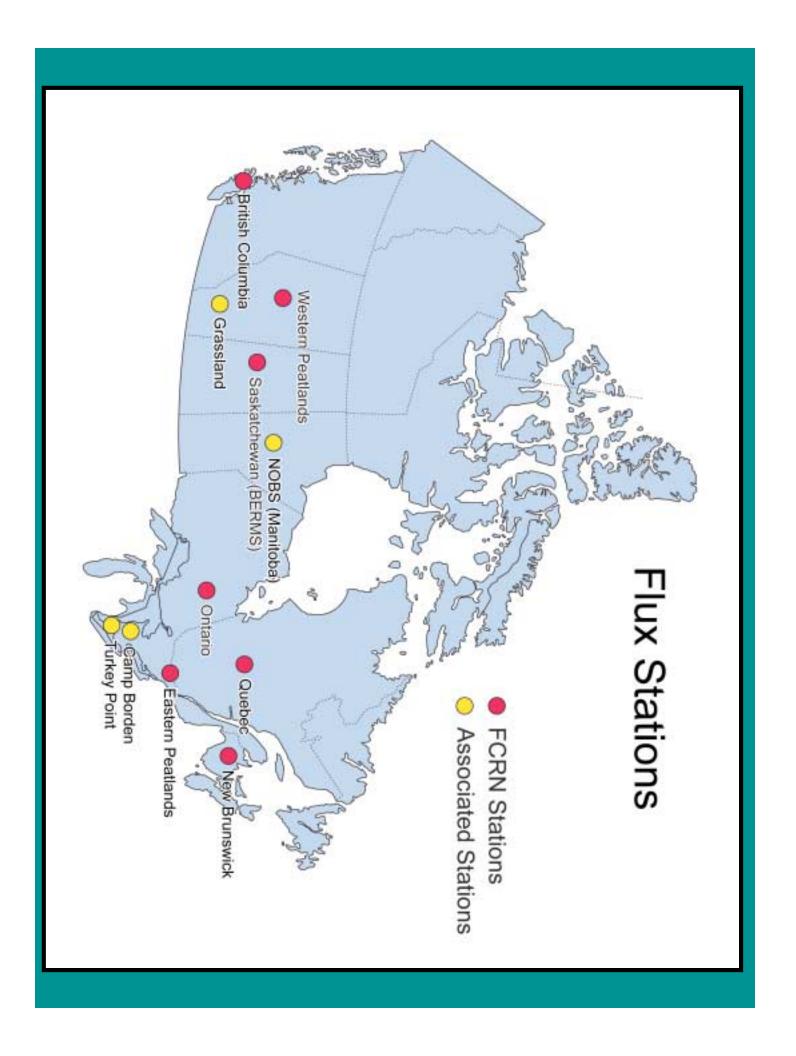
(1) To increase our understanding and our ability to model the effects of climate, natural disturbances, and forest management on terrestrial C cycling processes in the forests and peatlands of Canada.

(2) To contribute insights, ideas, and well-documented archived data sets to efforts aimed at understanding, constraining, and quantifying regional, national, continental, and global C cycles.

(3) Make a major contribution to understanding Canada,s role in the northern terrestrial carbon sink.

These objectives are being attained by establishing, maintaining and reinforcing an east-west transect of carbon flux stations across the commercial forest zone of Canada.





Flux Towers

- 19 operating permanent FCRN towers
- 2 more towers scheduled for 2004
- 3 roving towers to start in 2004
- 6 assoc-site flux towers including NOBS

30 Total (on a good day)

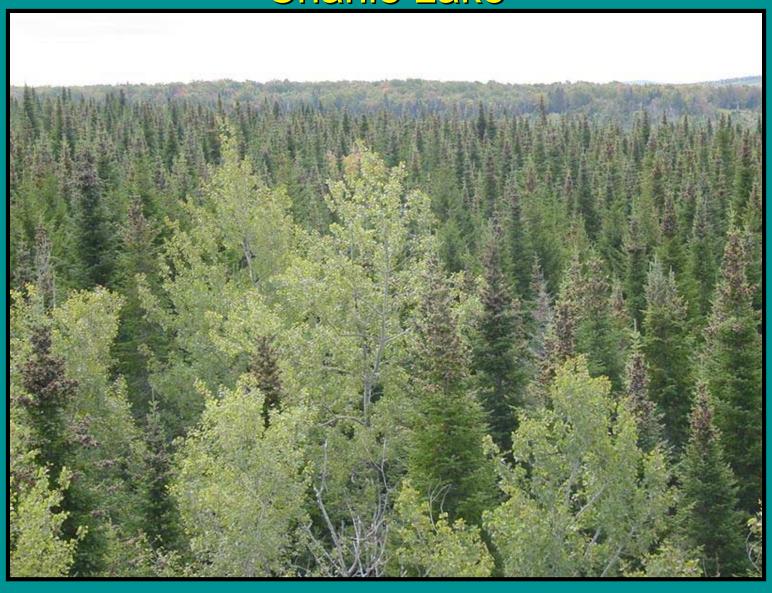
FCRN HIGHLIGHTS

- Forty-five graduate students.
- Forty-eight professors and government scientists (Canadian Forest Service, Meteorological Service of Canada, Canada Centre for Remote Sensing).
- Automated stable isotope sampling systems at five sites.
- Soil auto-chambers for continuous measurements of soil CO₂ efflux at eight of our permanent sites.

FCRN HIGHLIGHTS

- The FCRN Data Information System is up and running for internal network use.
- Initial public data release for 2006.
- Data fair-use policy.
- Full suite of flux, meteorology, canopy and soil processes, and site characterization measurements according to standardized protocols. (see Tables)
- Cross-checked algorithms for flux calculations and a standardised process for gap-filling and calculation of gross primary productivity and ecosystem respiration.

New Brunswick Balsam Fir – White Birch Charlie Lake



New Brunswick – Balsam Fir Nashwaak Lake



Quebec 2000 Cutover

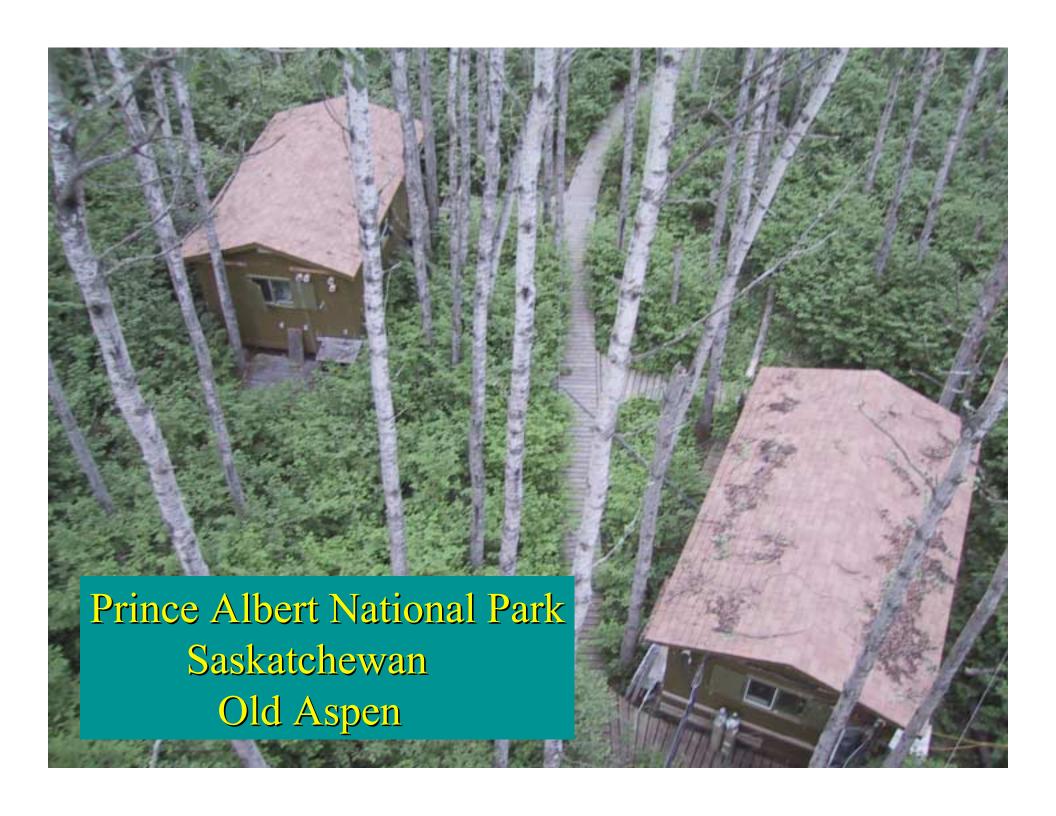


Chibougamau, Quebec Mature Black Spruce



Groundhog River, Ontario Mature Boreal Mixedwood





Saskatchewan (BERMS) Old Black Spruce





Saskatchewan (BERMS) Old Jack Pine

BERMS clear-cut site (logged in 2000)



BERMS 1994 Harvest





Jack Pine 1975 Harvest (formerly Young Jack Pine)







Saskatchewan (BERMS) Old Jack Pine

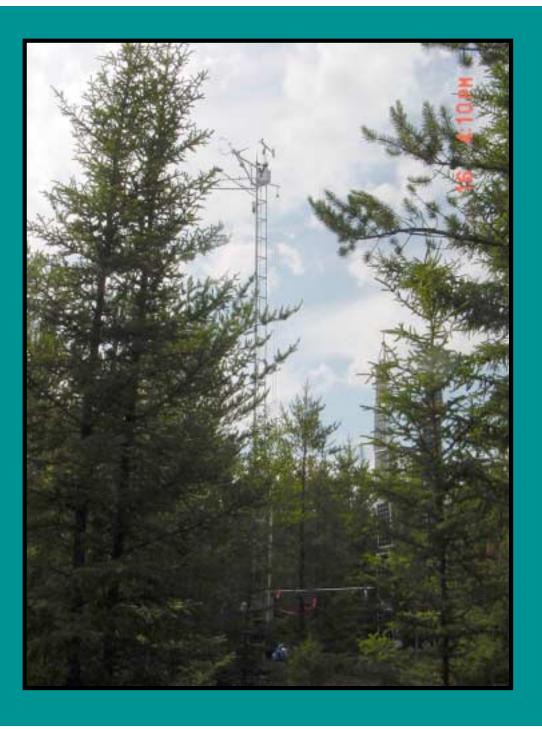
Saskatchewan (BERMS) 1998 Fire



Saskatchewan (BERMS): 1989 Fire



Saskatchewan (BERMS) 1977 Fire





Saskatchewan (BERMS) Old Jack Pine

British Columbia Mature Douglas Fir

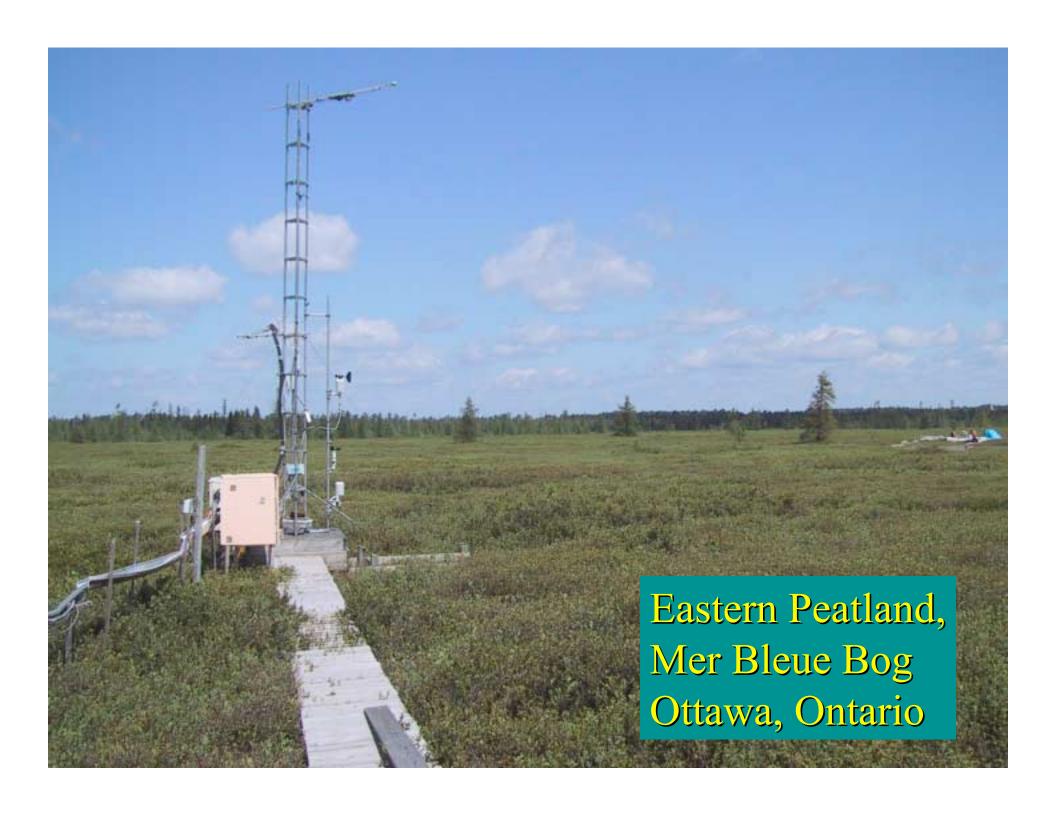


British Columbia Sapling Doug Fir



British Columbia Cutover 2000 Douglas Fir



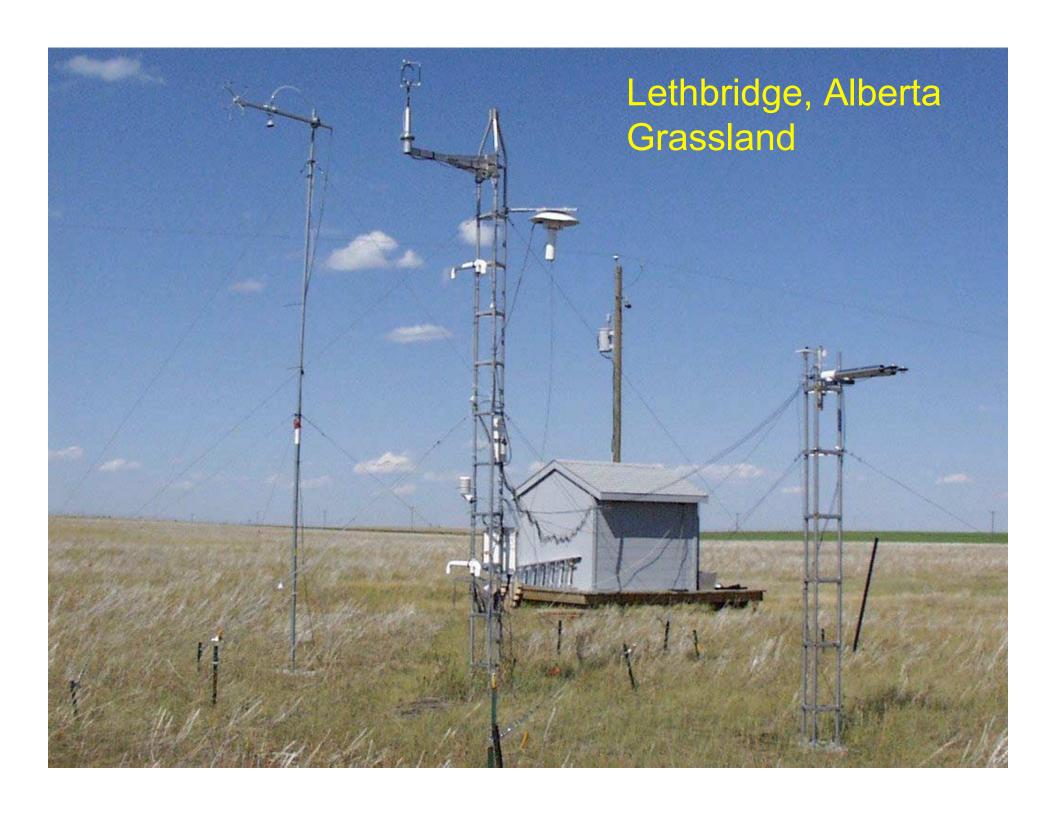




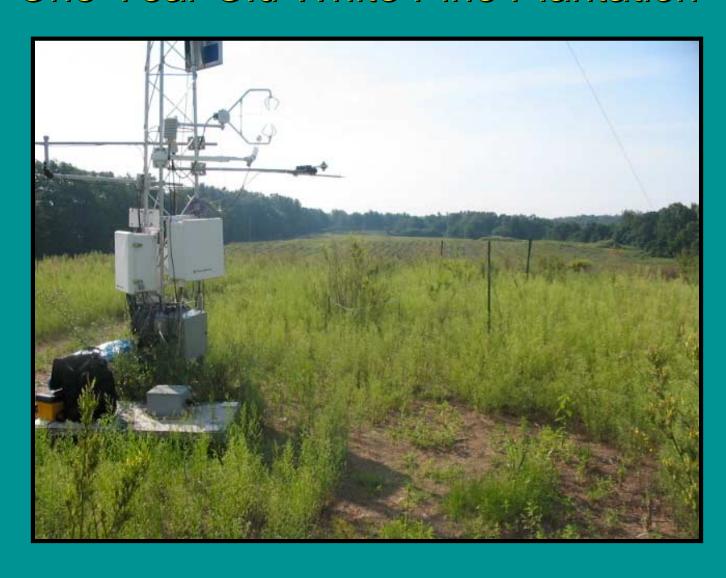
Saskatchewan Southern Fen



ASSOCIATED SITES



Turkey Point, Ontario One-Year Old White Pine Plantation



Turkey Point, Ontario 15-Year Old White Pine Plantation



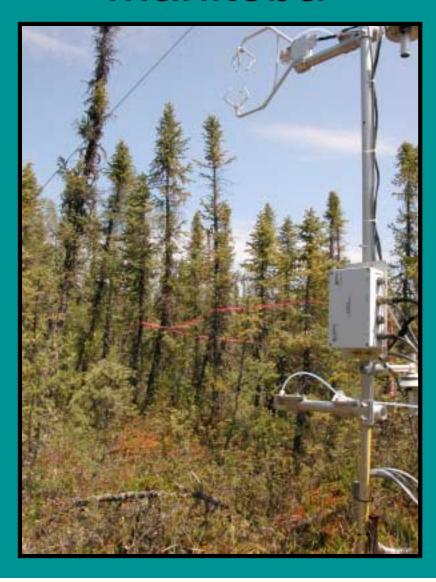
Turkey Point, Ontario 30-Year Old White Pine Plantation



Turkey Point, Ontario 60-Year Old White Pine Plantation



Northern Old Black Spruce, Manitoba



INTEGRATION WITH NACP: WHAT FCRN COULD OFFER NACP

- Significant Canadian infrastructure and top-quality science team.
- Open spirit of collaboration, especially for remote sensing studies.
- High-quality flux, meteorological, and ecological data in a well-organized DIS.
- The potential for a clear demonstration that NACP has established a continental scale collaboration.

WHAT NACP COULD OFFER FCRN:

- Significant expansion of FCRN research activities.
- Help with scaling activities.
- Tall tower(s).
- Interesting personal and scientific collaborations between scientists and students.
- Contribute to FCRN's continuation past 2007.

CURRENT INTEGRATION BETWEEN FCRN & GSFC - BIOSPHERIC SCIENCES

- Landsat chronosequence for FCRN (Jeff Masek)
- EO-1 acquisitions (Tom Brakke)
- Using FCRN measured light-use efficiency data and MODIS ocean reflectance bands to track light-use efficiency.

Collaboration: Guillaume Drolet, Forrest Hall, Fred Huemmrich, Nazmi Saleous, Betsy Middleton, etc.

CURRENT INTEGRATION WITH GSFC - BIOSPHERIC SCIENCES

Collaboration: J. Collatz, J. Masek, G. van der Werf

- Integrating national-level data sets for carbon flux modelling of Canada with CASA.
- Using FCRN sites for improving the treatment of respiration and fire emissions in boreal regions for the CASA model.
- Link to inverse modelling of methane, CO, and CO₂ emissions and their isotopic signatures.

Involvement With New Possible GSFC Carbon Projects

- Building on LEDAPS: Modelling disturbance-driven fluxes for southeast US and Canada (J. Collatz et al.).
- Estimating boreal forest biomass with GLAS, MISR, and MODIS (J. Ranson et al.).
- Error analysis of carbon stock estimates from lidar (R. Nelson et al.).

Involvement With Other New Possible Carbon Projects

 Microwave remote sensing of freeze-thaw cycles and links to respiratory processes in North America (K. McDonald et al.).

Global Fluxnet (Baldocchi et al.).

Some Ideas for Continuing the FCRN – NACP – GSFC Integration Into the Future

 My continued part-time presence at GSFC after summer 2005 (e.g., 4 to 6 months per year).

 Presence of three to four Canadian graduate students or recently graduated postdocs at GSFC via joint funding for joint projects (e.g., modeling, mapping, lidar).